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The Importance of Urban Habitat Connectivity and Influence on Native Avian Species and Community Science

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The Importance of Urban Habitat Connectivity and Influence on Native Avian Species and Community Science

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BACKGROUND

- Structurally complex environments like Backyard Certified Habitats in the Portland neighborhood Hillsdale, OR are used by a subset of avian species and may improve overall functional connectivity.[1]
- The preservation of backyards and their adjacent green-spaces are crucial in the long-term persistence of native bird assemblages, however urban conservation efforts have focused on native green-spaces, not backyards.[2]
- Avian richness models show urban exploiter species are minimized by reducing nonnative land cover and maintaining canopy closure in adjacent green-spaces (Fig 1).[3]
- Community science provides an opportunity for Backyard Certified residents to provide their own unbiased data to aid in the monitoring of bird populations.[4]
- The ecological effects of backyard networks on avian abundance and species richness have not been adequately studied.

Fig 1. Examples of urban exploiter species: European starling (left) and house sparrow (right).

OBJECTIVES

1) Evaluate the influence of green-space proximity on Backyard Certified Habitats (collaboration of the Audubon Society of Portland and Columbia Land Trust) on avian abundance and species richness.
2) Develop a framework for an urban backyard habitat community science program that consists of workshops, interactive training, and project specific curriculum.

METHODS

- Avian point counts (50m radius) were conducted in 5 certified backyards (n=1 per yard) and the Keller Woodlands (green-space) (n=6) in Hillsdale, OR. Surveys were conducted April through June 2016.
- Two community science workshops were held at the beginning and end of the project.
- Avian abundance, species richness, and community analyses were conducted in R Studio version 1.0.143
- Tree canopy (2014) was quantified using ArcGIS version 10.4.1.5686, data and map courteously of Oregon Metro Data Resource Center.
- Knowledge of local backyard habitat research and avian food-webs was evaluated among certified residents by distributing a survey after the initial workshop.

RESULTS

- Avian abundance and richness was not statistically different when in close proximity to Keller Woodlands (green-space) ($p>0.05$) (Fig 2, Fig 3).
- Backyard 3 had the greatest abundance with a mean of 15.8 birds and Backyard 2 had the greatest species richness with a mean of 12.1 (Fig 2).
- Keller (S10) and Backyard 1 (S1) were most similar in species community analysis (Fig 4).
- Canopy was the highest (150-180ft) in backyards closest to the green-space (1, 2) (Fig 5).
- One urban avoider species, European Starling, was not observed in this study (Fig 6).

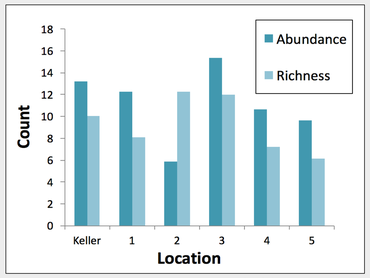

Fig 2. Backyards in increasing distance (mi) from Keller Woodlands and the mean abundance and richness for the backyards and Keller Woodlands.

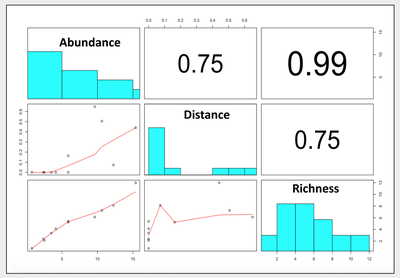

Fig 3. Coefficient matrix with non-normal, skewed distributions in the histograms & high relatedness in the coefficients and scatterplots.

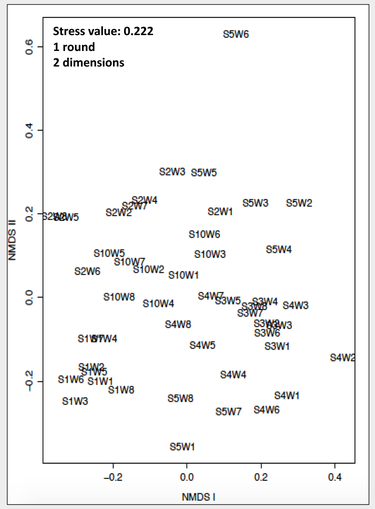

Fig 4. Non-metric multidimensional scaling schematic representing avian species in backyards (S1-S5) and Keller Woodlands (S10). S=location, W=week (1-8).

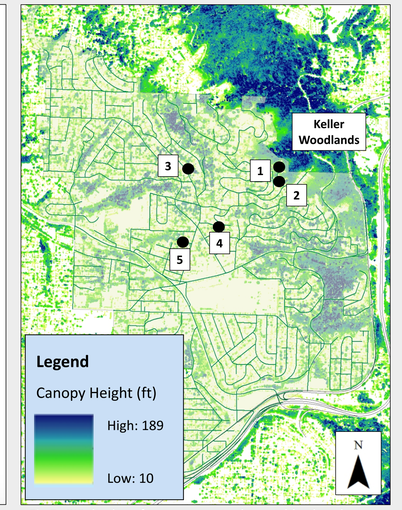

Fig 5. GIS display of tree canopy in the neighborhood Hillsdale, OR. Backyards (1-5) are labeled in increasing distance from the green-space.

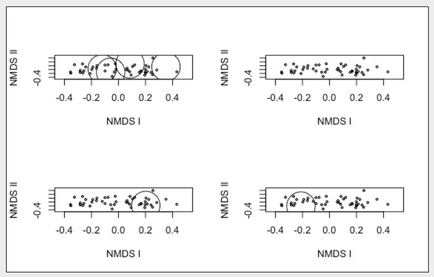

Fig 6. (top left to bottom right) Species abundance bubble plots of Downy Woodpecker, European Starling, Golden Crowned Warbler, and Hairy Woodpecker based on the NMDS plot. Dot size increases with abundance.

RESULTS (cont.)

- 37.5% of community scientists strongly agreed they have, "a basic knowledge of backyard habitat research that has been conducted in the Portland area." (Fig 7).

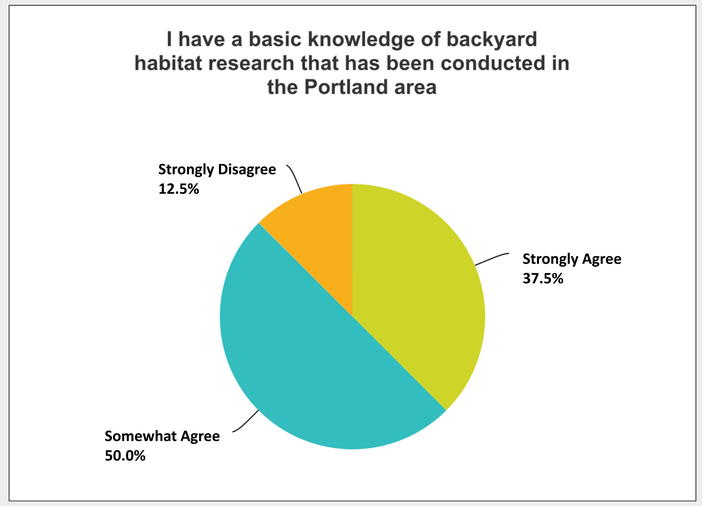

Fig 7. Pie chart displaying the percentages of the backyard community scientists' knowledge of backyard habitat research in Portland, OR. There were 8 total participants.

CONCLUSIONS

- Variables that affect avian abundance and species richness such as diversity in vegetation species, structure, canopy, and diameter at breast height should be studied concurrently in green-spaces and certified backyards.
- In addition to large green-spaces, smaller green-spaces with substantial canopy may serve as important population sources and may result in an decrease of nonnative, exploiter species.
- Food-web and predator prey studies using manipulative experimentation in addition to point count surveys are advised.
- We recommend using half-circle point counts (50m radius) in small yards for training ease during future surveys. Highly interactive, communicative, and in-depth workshops are also necessary to achieve the desired learning outcomes.

WORKS CITED & ACKNOWLEDGMENTS

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3) Donnelly, R. & Marzluff, J. M. 2006. *Urban Ecosyst* 9(1): 99-117
4) Liu, X. 2009. *IJESE* 4(3): 301-311

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